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# THE ROLE OF INTERNAL AND EXTERNAL DEMAND ON INDUSTRIAL DEVELOPMENT

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**The role of internal and external demand on industrial  
development**

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## **Abstract**

This paper attempts to examine the role of demand, both internal and external in developing the manufacturing sectors of countries. Using sub-sectoral manufacturing data in terms of technology content of products for a number of countries at different levels of development, and applying a demand decomposition technique, we are able to measure the contribution that domestic demand growth, export growth and changes in import substitution play in changes in sub-sectoral outputs. Analysis conducted here at the aggregate level suggests that internal and external demands have a potentially important role to play in developing manufacturing sector of an economy.

The broad conclusion that this paper arrives at is that increased demand for manufactured products plays a different and largely positive role in increasing industrial capabilities. If the increased demand is met by increasing domestic capabilities in production, this would potentially lead to positive externalities through learning by doing and learning by learning, as well as economies of scale, scope and agglomeration. For this to be the case however either the local economy should be large and dynamic and/or the country has access to large export markets for the products produced. It appears that for most of the countries in our dataset both factors have played a part in increasing manufacturing output but to what extent this increased output is a reflection of enhanced industrial capability, is not clear and require further analysis using data on value added rather than output. Import substitution changes also follow the expectation that technologically less sophisticated economies import a larger share of their demand for more technically demanding products, and countries more able rely more on the import of relatively simpler and labour intensive products.

## **1 Introduction**

Historical analyses of successful developers identify industrialization and an increased share of the manufacturing sector in economic activities as the driver of change. Engle's Law asserts that such structural change is necessary for development, as indicated by GDP per capita. The Law states that the income elasticity of demand for food is less than unity and that the share of total income spent on food therefore decreases as income rises. For an economy to develop and achieve sustained growth, it must undergo a process of structural change, focusing on the production of goods and services for which demand is elastic, such as manufactured goods. Moreover, manufacturing has significant positive externalities. Externalities are associated with economies of scale, scope and agglomeration as well as with learning by doing and learning by learning. The urbanized and centralized nature of manufacturing activities fosters these externalities. The extent to which these externalities can be realized depends, however, on the level of demand for manufactured products, i.e. on internal and external demand. The experiences of successful industrializers point to a number of key factors that relate to the size and quality of physical and human capital, institutional and governance factors as well as trade policy. The emphasis in this paper lies on the role of trade policy in the process of industrial development.

Trade policy has been extensively debated in the literature for decades. Early development literature highlighted the role of 'import substitution' as a means to achieve a high level of industrial development. It was claimed that import substitution and the associated infant industry argument expand a country's manufacturing sector and thereby not only reduce its marginal propensity to import, but that it also benefits from externalities associated with this development, resulting in the acquisition of skills and expertise in the production of these goods. This process is linked to the Prebisch-Singer hypothesis, and Bardhan (1971) provides a rationale for implementing such a strategy. In practice, however, this approach has only been successfully implemented by a small number of developing countries; the reasons for the successes and failures of these countries are discussed, amongst others, in Balassa (1980), Rodrik (1995), Amsden (1989) and Pack & Westphal (1986).

Demand-pull combined with supply-push factors have been key in explaining the achievements of successful developers. Market access and determining the potential market size for manufactured products are important demand-pull factors. The easing of constraints to increase the supply and sale of products as well as the quality and quantity of physical and human capital, governance and the establishment of proper institutions within the country are important supply-push factors. They are covered in endogenous growth theories.

Although the predominance of the ‘Washington Consensus’ throughout the 1980s changed the emphasis and direction of policy options, the experience of implementing these policies, especially in developing countries, redirected the attention of policymakers and economists to some of the former economic policies. The Asian financial crisis of 1997 and the global financial crisis of 2008 in particular further reinforced the arguments against the theory of the primacy of the market.

Economists have begun questioning the positive attributes of globalization. The impact of globalization has been uneven; it has been detrimental to the development of some countries, and is claimed to have caused de-industrialization in others.

This paper briefly reviews some of these claims. The next section presents a summary of data related to the state of the manufacturing sector in different countries according to their level of development as measured by their income per capita as well as their technological development. Different experiences of development are explained on the basis of the general indicators of demand-pull and supply-push factors, including the role of trade policies. The focus of this paper is the analysis of data on sources of demand for manufactured goods of different technological content and internal and external demand (Section III). Section IV concludes and summarizes the findings of the data analysis.

## **2 Stylized facts**

The role and significance of the manufacturing sector for industrialization and economic development is well established in the literature; literature supporting this finding includes the works of early development economists such as Rosenstein-Rodan (1948), Lewis (1954), Rostow (1960) and more recently Lall (1992) and Rodrik & McMillan (2011). The significance of the manufacturing sector is linked to economies of scale, a significant increase in the scope and accumulation of knowledge and skills, learning by doing and learning by learning. The manufacturing sector’s scope benefits considerably from technological progress, and promotes technological change through R&D activities carried out by firms within the sector for commercial utilization. Demand for manufactured products is generally elastic, and such goods are therefore more in line with sustainable growth.



A number of factors play a role in the successful development of the industrial/manufacturing sector, and can be divided into demand-pull and supply-push factors. All externalities associated with the manufacturing sector's development relate to the size and composition of the sector, which in turn is directly related to market size. With the exception of a very small number of very large countries, international markets offer developing countries a major window of opportunity and trade policy options should be adapted accordingly.

Equally important in the process of industrial development is the role supply-push factors can play and the industrial policy implemented by each country<sup>1</sup>. In order to be able to produce goods, particularly for international markets, key inputs such as the quantity and quality of capital and different types of labour and skills are necessary. The extent of the manufacturing sector's development is also directly related to the economic environment within which development activities take place. Neo-classical and particularly endogenous growth models highlight the role and significance of these factors. Important studies on these issues include Solow (1956), Mankiw et al. (1992), Romer (1986), Lucas (1988), and Acemoglu and Robinson (2012).

The following section examines the different development trajectories of countries' manufacturing sectors based on available data of different country groups in terms of level of development measured by income and the extent of their technological development. Some of the factors that explain the different levels of development in countries' manufacturing sectors are discussed.

## **2.1 Explaining differential levels of industrial development**

A number of factors, a summary of which was briefly addressed above, explain the difference in levels of industrial development. With reference to the country categories based on income level and technological development, some of the general factors, particularly those related to trade, will be discussed below, starting with a few development indicators presented in Table 1.

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<sup>1</sup> For a discussion and explanation of varieties and development of industrial policies over time, see Weiss (2016).

**Table 1** Selected development indicators by income group

		<b>60-69</b>	<b>70-79</b>	<b>80-89</b>	<b>90-99</b>	<b>00-09</b>	<b>10-16</b>
<b>Low income</b>	1			469.1	422.4	452.0	550.1
	2			-0.2	-1.0	1.7	2.5
	3				9.6	10.7	8.8
	4			2.6	-1.9	2.1	6.1
	5	2.4	2.5	2.5	2.8	2.8	2.8
	6	171.7	219.6	279.9	365.9	480.8	597.0
<b>Lower middle income</b>	1	579.2	728.4	854.1	984.8	1308.2	1838.9
	2	1.6	2.5	1.5	1.3	4.1	4.2
	3	13.2	14.6	16.1	17.6	17.5	16.6
	4	5.8	5.9	5.6	4.3	5.9	6.0
	5	2.3	2.4	2.4	2.0	1.7	1.5
	6	1051.0	1326.3	1682.0	2089.5	2494.5	2822.9
<b>Middle income</b>	1	1123.7	1618.5	1952.8	2177.5	3007.3	4299.5
	2	2.9	3.5	1.4	1.2	4.6	4.0
	3	22.6	26.4	26.5	23.8	22.2	20.6
	4						
	5	2.2	2.2	2.0	1.6	1.2	1.2
	6	2327.9	2916.8	3563.0	4260.5	4885.3	5366.1
<b>Upper middle income</b>	1	1571.1	2370.4	2944.6	3325.9	4785.9	7032.4
	2	3.5	3.9	1.5	1.4	5.0	4.3
	3	25.0	29.4	29.5	25.8	23.6	21.7
	4						
	5	2.1	2.0	1.6	1.2	0.8	0.8
	6	1276.9	1590.5	1881.0	2171.0	2390.9	2543.2
<b>High income</b>	1	14231.5	20175.3	25069.3	31258.0	37681.4	40005.1
	2	4.4	2.9	2.3	1.9	1.1	1.3
	3				18.2	16.2	14.9
	4				2.9	1.3	2.6
	5	1.2	0.9	0.7	0.7	0.7	0.6
	6	803.0	889.0	963.5	1035.5	1109.6	1170.8

*Notes:* GDP per capita (constant US\$ 2010); 2: GDP per capita growth (annual in per cent); 3: Manufacturing value added (percentage of GDP); 4: Manufacturing value added (annual growth in per cent); 5: Population growth (annual in per cent); 6: Population, total (million).

*Source:* Author's elaboration based on World Development Indicators (World Bank, 2016a).

As indicated in Table 1, all income groups with the exception of the low income group recorded a positive GDP per capita growth rate over the period 1960-2016. The growth rate for the high income group is smaller than that of other income groups, signifying a catching up process. In terms of manufacturing value added as a percentage of GDP, which is an indicator of industrial capacity and development, the shares between different income categories varied in different periods. On the whole, however, the share of manufacturing value added was lowest for the low income group and highest for the middle income and upper middle income groups. The share for the lower middle income and high income countries was between those two income groups. The lower income group registered a relatively high growth rate of over 5 per cent for most of the periods. The high income group's share of manufacturing value added, on the other hand, declined over the period 1990-2016.

Table 1 provides further information on the general economic and investment environment, capturing the demand-pull and supply-push factors referred to earlier. Domestic credits to the private sector by banks captures the role of finance; expenditure on education by the government is a proxy for human capital formation; fixed telephone subscriptions are a broad proxy for infrastructure support; and the share of gross fixed capital formation in GDP and its growth is a demand-pull factor for changes in economic activity.

In terms of finance, a considerable difference between lower income and higher income groups is evident. Low income countries are well behind lower income, on average, and especially behind middle, upper middle and high income groups. Development in this regard is similar for middle and upper income groups, approaching those of higher income in the latter periods; the higher income group has had an advantage over other income groups since 1980 onwards.

In terms of government expenditure on education, however, lower income country groups had a higher share compared to higher income groups. Given Wagner's law however and the size of GDP as well as the size of government expenditure, the per capita figures are expected to be much higher for higher income groups compared to those country groups with a lower level of development and income. Adding the role of the private sector in education provision in developed market economies, human capital development in wealthier economies as a measure of education is likely to be much higher compared to those at a lower level of development and income.

**Table 1** Selected economic and investment environment indicators by income group

		<b>60-69</b>	<b>70-79</b>	<b>80-89</b>	<b>90-99</b>	<b>00-09</b>	<b>10-16</b>
<b>Low income</b>	1	7.5	10.7	10.9	11.1	12.7	17.0
	2					16.6	16.2
	3		0.2	0.4	0.5	0.9	0.9
	4				16.5	19.6	25.0
	5					8.8	7.3
<b>Lower middle income</b>	1	11.0	15.3	21.9	27.3	33.0	39.7
	2					15.9	16.4
	3	0.3	0.6	0.9	1.9	4.5	4.6
	4		20.9	21.4	22.0	23.9	26.4
	5			2.9	2.5	8.5	6.1
<b>Middle income</b>	1	16.3	21.5	33.1	43.8	52.7	77.6
	2					15.2	16.1
	3		1.2	1.9	4.4	12.3	11.7
	4	18.7	23.5	24.8	24.9	26.7	30.0
	5				0.7	9.5	6.5
<b>Upper middle income</b>	1		25.4	38.2	49.0	58.5	87.8
	2				16.3	14.6	14.9
	3		1.6	2.7	6.8	20.2	19.4
	4	19.7	24.9	25.8	25.7	27.5	31.0
	5				0.6	9.7	6.6
<b>High income</b>	1	42.1	58.0	71.3	87.7	86.8	87.5
	2				11.8	12.6	12.4
	3	12.8	23.8	34.2	47.4	50.9	44.3
	4	24.2	25.1	24.0	22.7	22.1	20.4
	5		3.3	3.4	2.8	0.8	2.2

*Notes:* 1: Domestic credit to the private sector by banks (percentage of GDP); 2: Expenditure on education as percentage of total government expenditure (in per cent); 3: Fixed telephone subscriptions (per 100 people); 4: Gross fixed capital formation (percentage of GDP); 5: Gross fixed capital formation (annual growth in per cent).

*Source:* Author's elaboration based on World Development Indicators (World Bank 2016a).

As a proxy for infrastructure development and communication, fixed telephone subscriptions directly follow the income level; the low income category is by far the least developed and the high income group is the most developed by a very large margin. Although the upper middle income, and to some extent the middle income group, show evidence of catching up, but the gap between the two is still considerable. The performance of lower middle income countries in infrastructure and development is much better than that of the low income group, but it still lags far behind that of the higher income groups.

In term of gross fixed capital formation, a proxy to capture changes in economic activity over time and in catching up, the share of high income countries has remained relatively stable at over 20 per cent over the period, albeit showing evidence of a decline in more recent periods. Middle and upper middle income categories recorded a larger share of gross fixed capital in GDP with a stronger rate of growth over the entire period. Recent data for low income countries on this issue indicate a lower share of fixed capital in GDP during the 1990s despite growing at a similar rate as higher income groups since then. It is important to place emphasis on differences in the magnitude of investment, given the substantial differences in size of GDP of the different income groups.

## **2.2 Trade policy**

Trade policy plays a significant role in growth and productivity, and in the context of present paper, on countries' industrial development. Market potentials offered by international trade, together with the competition it generates, provide a foundation for achieving scale economies as well as productive efficiency through competition in various manufacturing subsectors. The last few decades, following the recent wave of globalization, have been characterized by a considerable increase in international trade with the extensive participation of developing countries. This increase has been associated with reduced frictions in trade due to, among others, reductions in tariff rates and improved supportive services for trade. Table 2 provides relevant trade-related information for different income and technology classifications.

As Table 2 shows, trade as a percentage of GDP has increased for all country groups; the last figure for both low income and high income groups is similar at over 60 per cent. The share of lower middle income countries is over 56 per cent, followed by that of the middle income and upper middle income group at around 53 per cent and 52 per cent, respectively.

A clearer picture of the capabilities of different country groups emerges when looking at the components of trade, export and import. The share of exports in GDP changes positively, albeit slowly and at a lower rate, as income level changes. The reverse applies to the share of imports in GDP; the dependence of low income groups on imports is highest followed by the high income category. The share of manufacturing exports (merchandised exports) in GDP provides a better indication of a country's industrial capabilities. Accordingly, the shares increase with income; the share of the high income group was highest and stable over time, while no data for low income countries was available. The same holds for the share of manufactured goods in merchandise imports; the last share figure is highest for the high income country group and lowest for the low income group.

**Table 2 Selected trade environment indicators by income group**

		<b>60-69</b>	<b>70-79</b>	<b>80-89</b>	<b>90-99</b>	<b>00-09</b>	<b>10-16</b>
	1				18.1	21.7	22.8
	2				30.6	35.5	40.2
	3						
<b>Low income</b>	4				62.9	58.5	55.2
	5				25.6	13.4	11.7
	6				25.7	13.2	11.4
	7				48.7	57.2	63.0
	1	9.8	14.0	15.3	21.4	27.4	26.3
	2	11.8	15.7	18.0	23.2	29.1	30.4
	3	21.1	23.7	31.1	53.4	53.8	49.3
<b>Lower middle income</b>	4	62.0	60.4	57.5	60.8	58.8	56.1
	5				15.5	11.3	7.8
	6				15.2	10.9	7.5
	7	21.6	29.7	33.3	44.6	56.5	56.6
	1	8.8	11.1	14.6	21.3	29.5	26.9
	2	9.1	11.7	15.3	20.9	26.6	26.3
	3			42.2	63.8	63.5	62.0
<b>Middle income</b>	4			65.8	72.7	69.3	63.8
	5				14.5	10.9	7.7
	6				14.4	10.7	7.5
	7	18.0	22.8	30.0	42.3	56.1	53.2

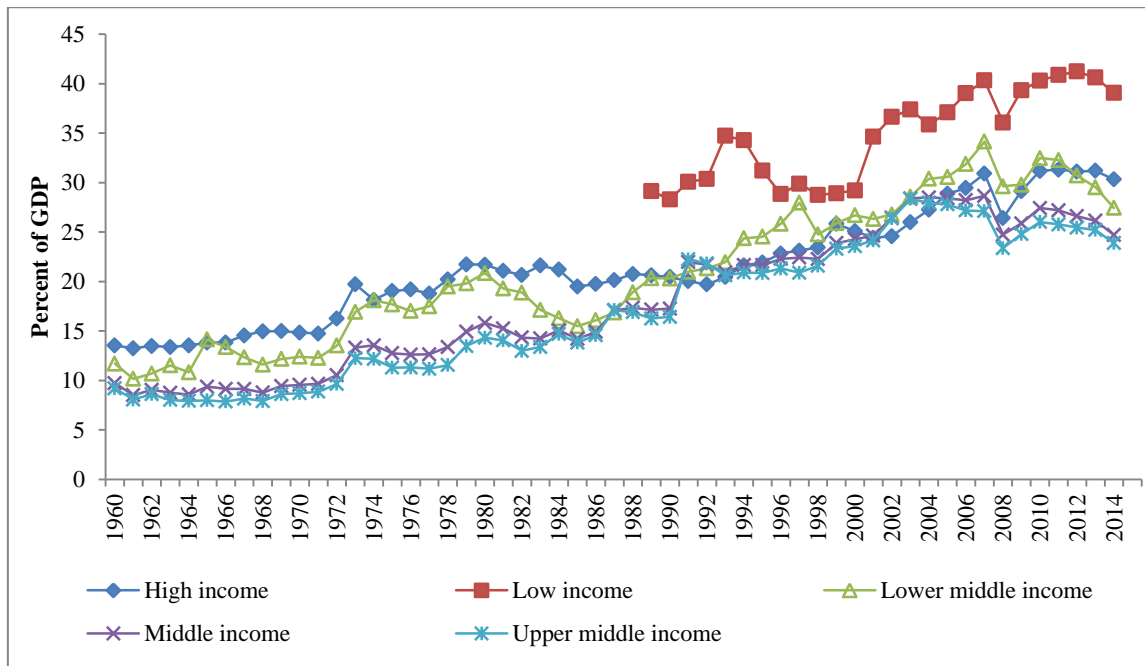
<b>Upper middle income</b>	1	8.6	10.2	14.4	21.3	30.0	27.1
	2	8.4	10.6	14.5	20.3	25.9	25.2
	3			42.8	65.9	65.7	64.3
	4			67.4	76.1	72.6	65.9
	5				14.1	10.7	7.6
	6				14.1	10.6	7.5
	7	16.9	20.8	29.0	41.6	56.0	52.3
<b>High income</b>	1	13.5	17.6	20.4	21.9	27.1	31.4
	2	13.7	17.6	20.8	21.4	26.9	30.7
	3	66.1	69.4	71.8	75.9	73.9	68.6
	4	49.9	55.8	62.1	74.3	71.9	68.6
	5				5.1	4.1	3.4
	6				4.6	3.6	3.2
	7	27.2	35.2	41.2	43.3	54.0	62.1

*Notes:* 1: Exports of goods and services (percentage of GDP); 2: Imports of goods and services (percentage of GDP); 3: Manufacturing exports (percentage of merchandise exports); 4: Manufacturing imports (percentage of merchandise imports); 5: Tariff rate, applied, simple mean, all products (per cent); 6: Tariff rate, applied, simple mean, manufactured products (per cent); 7: Trade (percentage of GDP).

*Source:* Author's elaboration based on World Development Indicators (World Bank 2016a).

Figures 1-3 illustrate the changes in the share of trade in GDP as well as of exports and imports over time for different groups of countries. Although there have been oscillations in the share of trade for all country groups, it has been increasing for all country groups covered here. Since the global financial crisis of 2008 and a sharp drop in the share of trade for all country groups affected by it, the speed of growth has slowed down and entered negative territory in recent years. The data suggests an increasing contribution of trade in GDP by lower income countries, which—as will be discussed later—seems to be attributable to China since the country's economic reform starting in the early 1980s.

**Figure 1** Share of trade in GDP

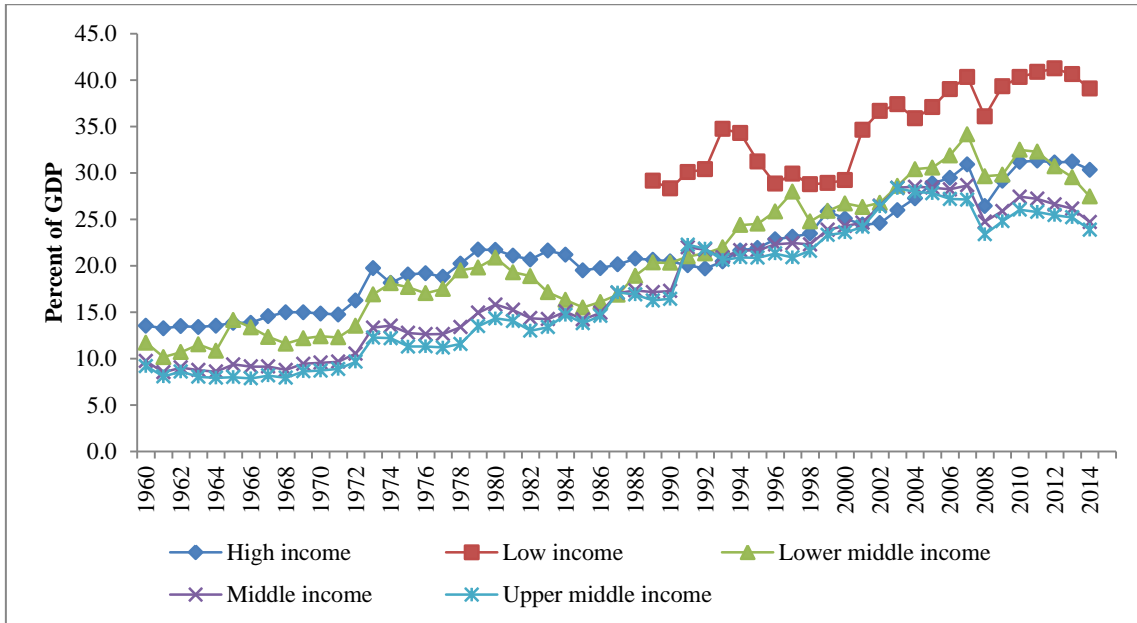


Source: Author's elaboration based on World Development Indicators (World Bank, 2016a).

Although the low income group of countries seems to have a relatively larger share of trade in GDP, it is attributable primarily to the much larger share of imports of this country group. Trends in imports for different country groups are similar to those of their total trade, which slightly differs from the share of exports shown in Figure 2. Unlike imports, exports are likely to more fully capture the efficiency and capabilities of countries. As regards the share of exports in GDP, that of high income countries seems to have been higher over the period 1960-1990, though thereafter, the share of exports from the lower middle income and particularly from the middle and upper middle income group was higher until the global financial crisis. Since then, the share of exports in GDP has been higher and positive for the high income category unlike other income groups which have witnessed a decline in their share of exports.

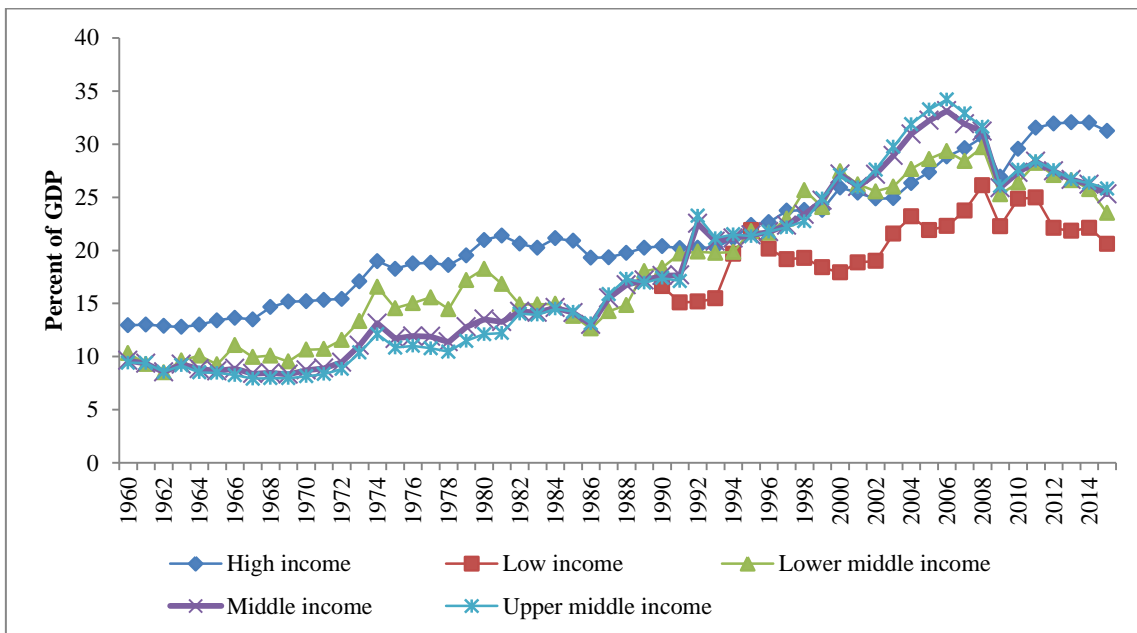


**Figure 2 Share of imports in GDP**



Source: Author's elaboration based on World Development Indicators (World Bank, 2016a).

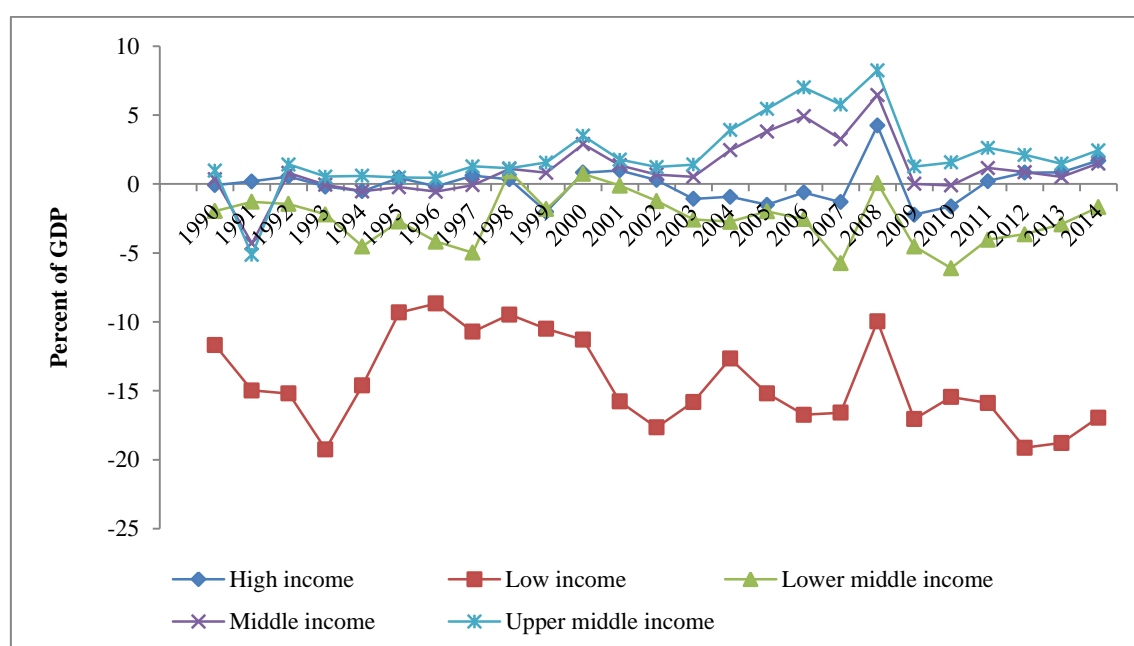
**Figure 3 Share of exports in GDP**



Source: Author's elaboration based on World Development Indicators (World Bank, 2016a).

Figure 4 provides a clearer picture of the dependence on imports and of the development of net exports over the period 1990-2014, for which comparable data is available for all income groups. The net export as a percentage of GDP was, on the whole, positive and rising in the period before the global financial crisis for the middle income and particularly for the upper middle income category. Despite declining ever since, it has remained positive for the upper middle income category. Net exports of the lower income group have been oscillating around 0 per cent and -5 per cent. Net exports for the low income group have been negative across the entire period and have been increasing at a higher rate of decline since the late 1990s.

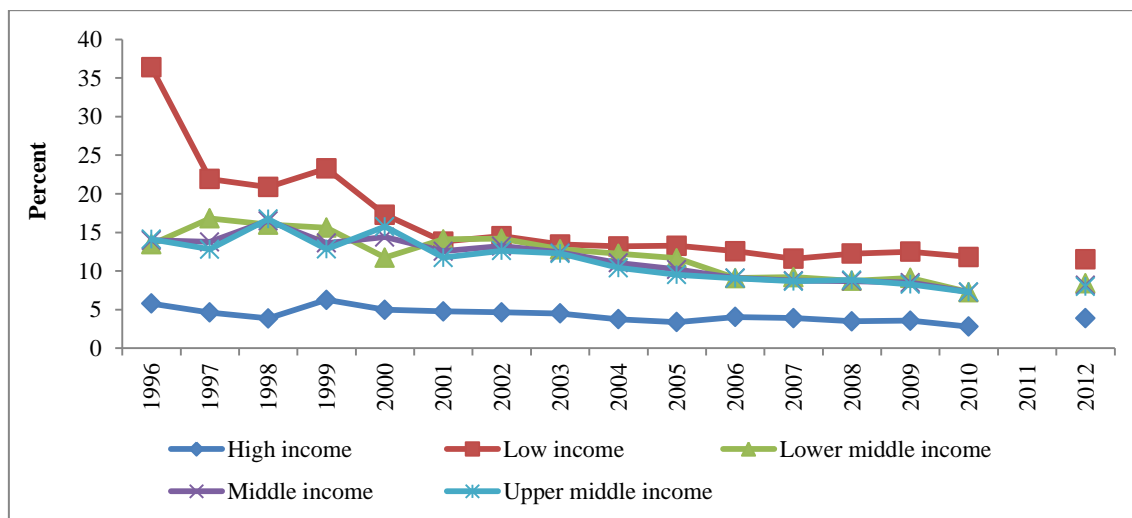
**Figure 4** Share of net exports in GDP



Source: Author's elaboration based on World Development Indicators (World Bank 2016a).

Changes in trade share may be attributable to a number of factors related to trade policy as well as a country's development and industrial capabilities. Changes in tariff rates can be examined as an indicator of changes in trade policy over time. As illustrated in Figure 5, the tariff rates of different country categories, albeit narrowing in the period after 1995, they still differ. The tariff rate has been stable and much lower for high income categories over the entire period, and higher for other income groups, though declining over time. The rate of decline in tariffs has been much higher for the low income groups compared with others; however, the rate continues to remain higher for this group compared to others.

**Figure 5 Tariff rates for all traded goods by income group**



Note: Simple mean applied to tariffs for all goods.

Source: Author’s elaboration based on World Development Indicators (World Bank, 2016a).

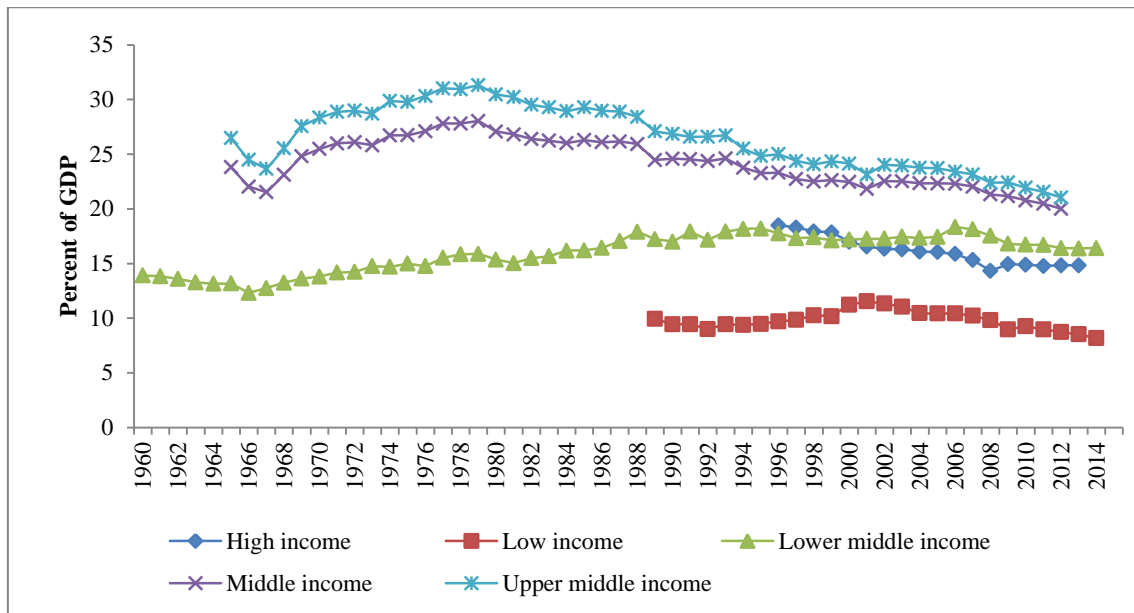
### 2.3 Manufacturing value added

Although developments in trade and particularly in the export share in GDP provide a basis for comparing countries in terms of their level of industrial development, changes in manufacturing value added over time and trade shares in GDP would provide a more accurate picture. Aggregate data on the significance of manufacturing value added (MVA) for different income categories is presented in Figure 6. The data suggest an upward trend in the share of MVA in GDP for middle income and upper middle income countries during the 1980s and a decline in the rate since then. For the lower income category, which started from a much lower share of MVA in GDP of around 12 per cent, the upward trend continued until approximately 2005, but at a slow rate. The reason for this may be the China factor, which will be discussed later. Data available for the high income category indicates a decline in the share of MVA in GDP from 1994 onwards. As far as the low income group of countries is concerned, its MVA share in GDP of below 10 per cent indicates a very small upward move from 1990 until 2000, and a gradual larger decline ever since<sup>2</sup>.

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<sup>2</sup> It is important to point out that variations in the share of MVA in GDP may also be attributable to countries’ individual patterns of development and the implications this has for the sectoral contribution to the overall output within an economy, i.e. structural changes of the type Chenery and Syrquin (1975) have looked into, for example.

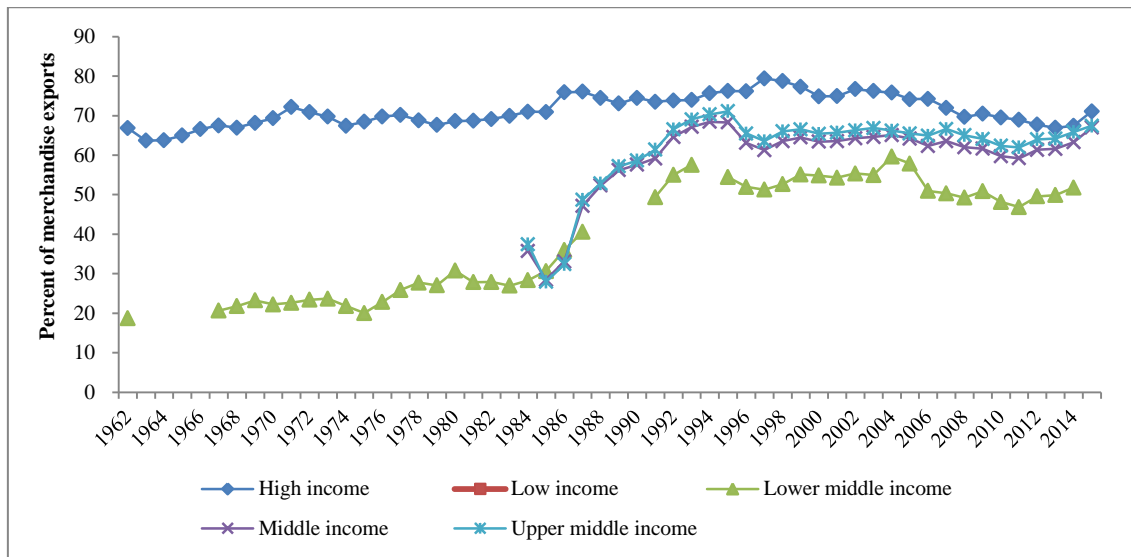
**Figure 6** Share of manufacturing value added in GDP



Source: Author’s elaboration based on World Development Indicators (World Bank, 2016a).

Trade in manufactured goods, particularly their export, provides a better indication of a country’s industrial development and its capabilities. Figure 7 illustrates that the high income group dominated others in the export of manufactured goods; since 1960, over 60 per cent of exports by this group has consisted of manufactured products, and the rate has remained relatively stable over the entire period. The upper and middle income categories’ share of manufacturing exports, increased steadily to around 60 per cent starting from approximately 40 per cent, and has remained relatively stable since the mid-1990s. The share of manufacturing exports of the lower income group started from around 20 per cent and climbed to around 25 per cent by 1982 and began rising at a much higher rate from the early 1980s to over 50 per cent by mid-1990. The rate has remained relatively stable, though it has declined over some periods.

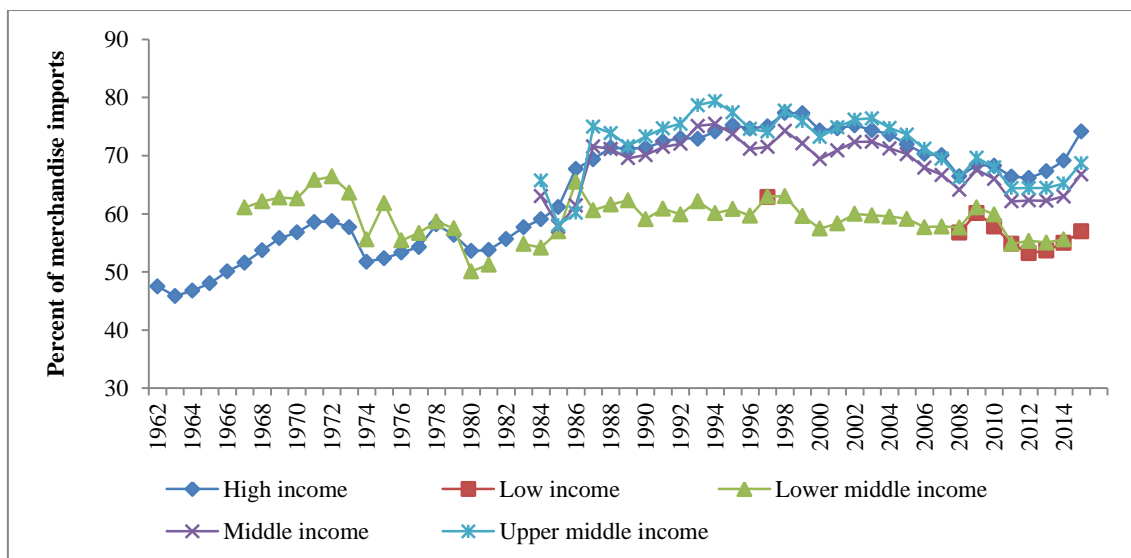
**Figure 7** Share of manufacturing exports in merchandise exports



Source: Author's elaboration based on World Development Indicators (World Bank, 2016a).

Figure 8 illustrates the changes in the share of manufacturing imports for the different country groups. The share of manufacturing imports in the total imports of the high, middle and upper middle income groups increased between 1960 and mid-1980, and remained relatively stable until 2000. Consequently, the country groups' share of manufacturing imports decreased for some time to then recover slightly. The share of manufactured imports in the total imports of the low income group has been oscillating in the 55 per cent to 65 per cent range over the entire period. The available data for the low income group is, however, limited and it is thus not possible to arrive at any sound conclusions.

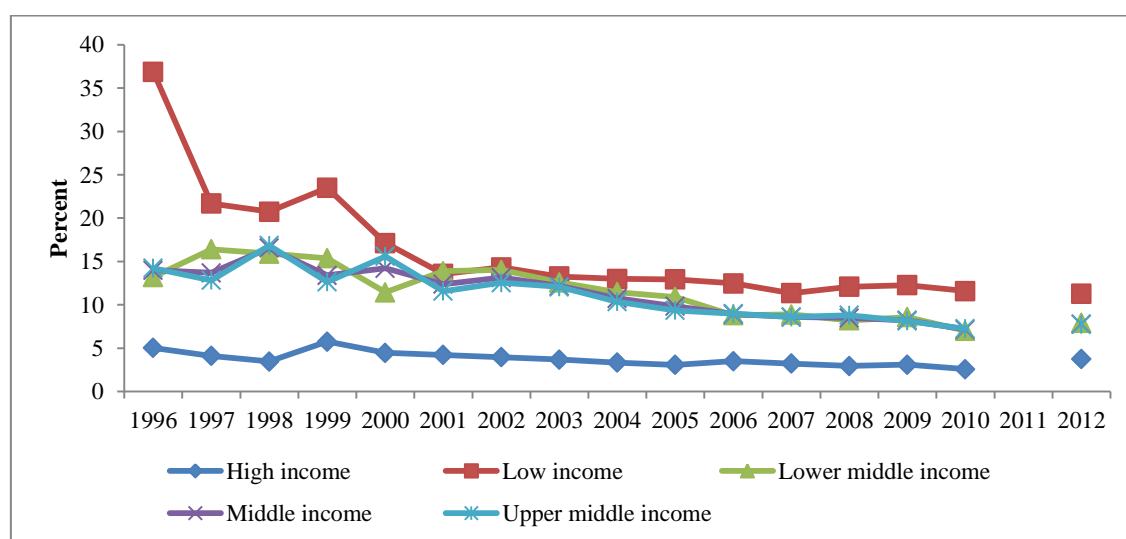
**Figure 8** Share of manufacturing imports in merchandise imports



Source: Author's elaboration based on World Development Indicators (World Bank, 2016a).

Success and failure in industrial development and trade in manufactured goods is linked to the country's trade and industrial policies, and more importantly the environment within which the economy—and more specifically the manufacturing sector—operates. Tariff rates play an important role in trade policy. Figures 9 and 10 present the development of the simple average tariff rates over time as applied to the manufacturing sector. For both the general and most favoured nations, the rate has been lowest for the high income group over the last couple of decades. For other income categories, though the rates are converging, they remain above those of the high income group; this is particularly the case for the low income category.

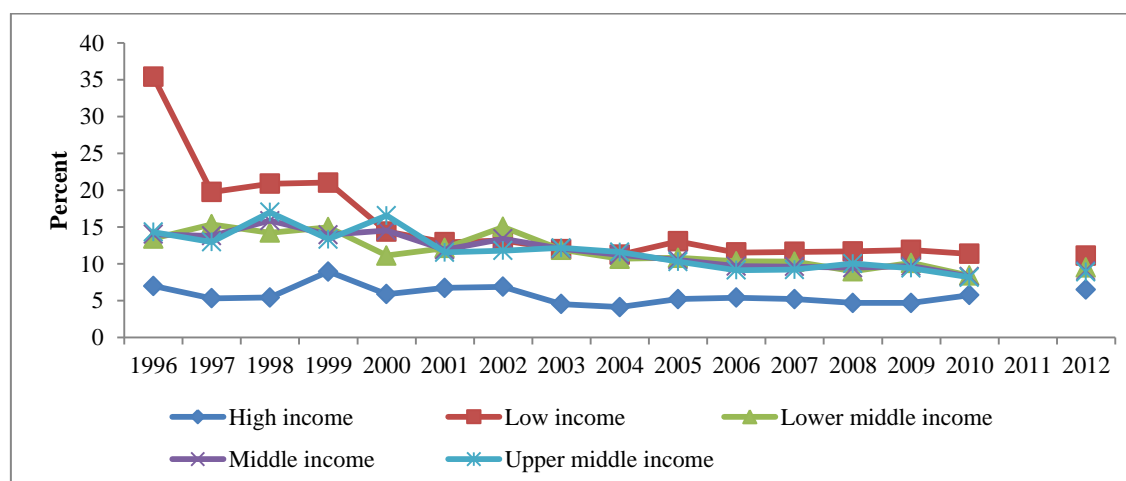
**Figure 9** Tariff rates for all traded manufacturing goods by income group



Note: Simple mean applied to tariffs for manufacturing goods.

Source: Author's elaboration based on World Development Indicators (World Bank, 2016a).

**Figure 10** Tariff rates for all traded manufacturing goods by income group, most favoured nation

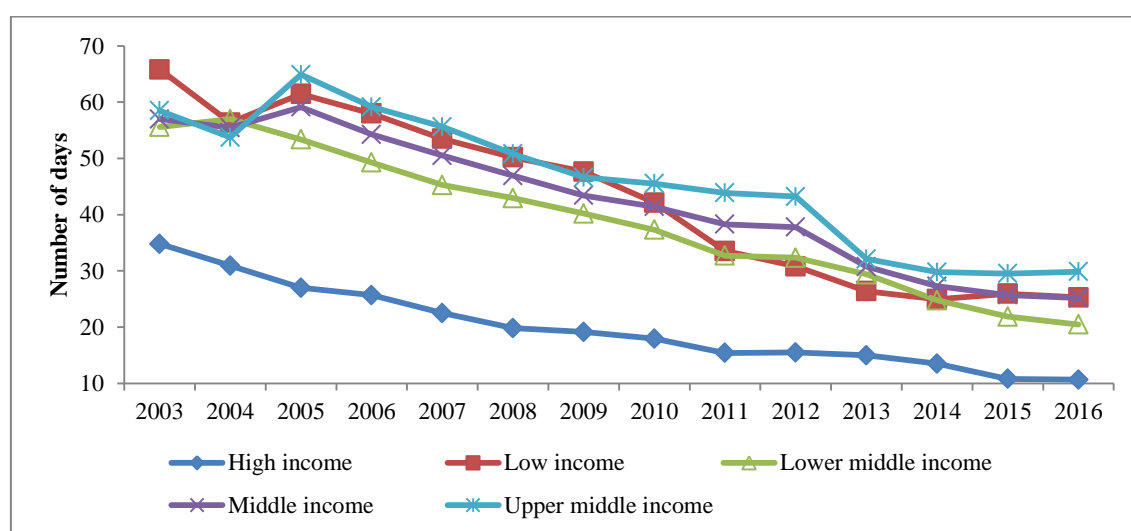


Note: The simple mean most favoured nation tariff rate is the unweighted average of the most favoured nation rates for all products subject to tariffs calculated for all traded goods. Data are classified using the Harmonized System of Trade at the six- or eight-digit level. Tariff line data were matched to the Standard International Trade Classification (SITC) revision 3 codes to define commodity groups. Manufactured products are commodities classified in SITC revision 3 sections 5-8, excluding division 68.

Source: Author's elaboration based on World Development Indicators (World Bank, 2016a).

Other factors, such as institutional and governance factors as well as the country's level of development, are likely to play a more important role. Table (4) provides information on a number of indicators capturing the costs associated with trade and doing business in different income categories; differences in any of the indicators are expected to have implications for the competitiveness of producers in both domestic and particularly in international markets. Two proxies that reflect a combination of these factors are illustrated in Figures 11 and 12. The time required to start a business, for example, indicates a considerable disadvantage of other country groups compared with the high income group; although the gap has narrowed over the period according to available data, it continues to remain large<sup>3</sup>. The time required to export differs considerably, however. This indicator is the smallest and has remained stable over time for the high income category. The gap between the high income and other income categories, particularly the low income group, remains large despite narrowing over time; the low income group's cost with respect to the time required to export is about four times higher than that of the high income group and about twice as high as that of other income groups.

**Figure 11 Time required to start a business**



Source: Author's elaboration based on World Development Indicators (World Bank, 2016a).

<sup>3</sup> One could argue that the opportunity cost of time is much smaller in lower income categories compared with the more developed/industrial groups. Data available on various indicators of governance published by Kaufmann and Kraay (2002), for example, and reported in the World Bank's Worldwide Governance Indicators (available at: <http://info.worldbank.org/governance/wgi/#home>) suggests that less developed countries/lower income groups generally suffer from a wide range of governance shortcomings that impose extra costs on, amongst others, producers in these countries.

**Table 3 Selected indicators of cost of trade and doing business by income group**

		<b>2000-09</b>	<b>2010-16</b>
<b>Low income</b>	1	256.1	101.0
	2	1947.6	2322.6
	3	2436.1	3051.3
	4	8.2	7.8
	5	10.3	9.7
	6	56.1	29.9
	7	40.7	36.2
	8	48.0	43.1
<b>Lower middle income</b>	1	69.7	35.7
	2	1254.3	1543.6
	3	1466.1	1847.4
	4	7.3	7.1
	5	8.3	7.9
	6	49.1	28.4
	7	29.1	25.8
	8	34.5	29.8
<b>Middle income</b>	1	54.7	27.6
	2	1245.9	1484.7
	3	1450.0	1750.7
	4	6.8	6.6
	5	7.9	7.5
	6	52.4	32.3
	7	26.6	23.2
	8	30.6	26.5
<b>Upper middle income</b>	1	39.6	19.6
	2	1237.6	1425.8
	3	1434.2	1654.0
	4	6.3	6.1
	5	7.5	7.0
	6	55.6	36.3
	7	24.1	20.7
	8	26.7	23.2

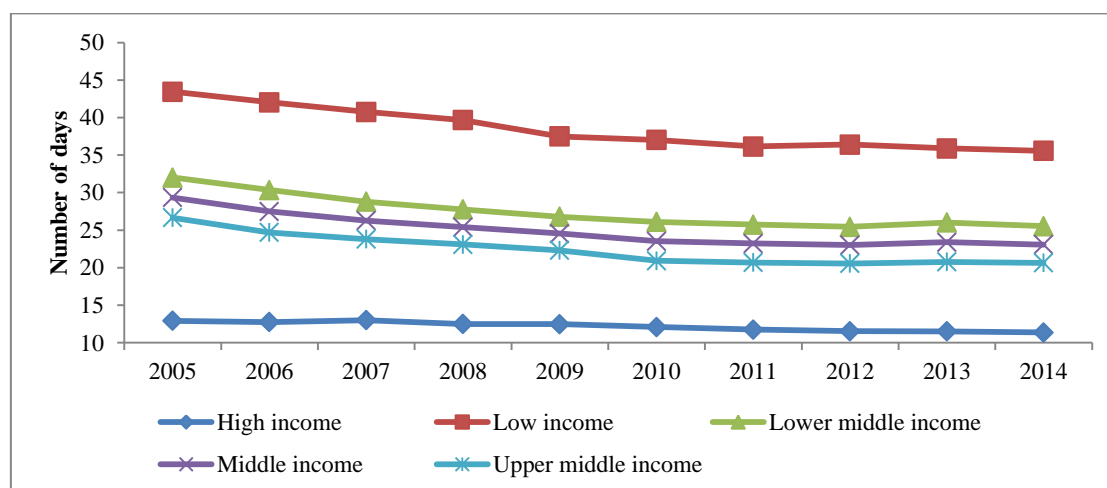


	1	9.0	5.3
	2	884.8	972.8
	3	995.1	1082.2
<b>High income</b>	4	4.3	4.2
	5	5.3	5.1
	6	25.7	14.1
	7	12.7	11.7
	8	12.7	11.2

*Notes:* 1: Cost of business start-up procedures, male (percentage of GNI per capita); 2: Cost to export (US\$ per container); 3: Cost to import (US\$ per container); 4: Documents to export (number); 5: Documents to import (number); 6: Time required to start a business (days); 7: Time to export (days); 8: Time to import (days).

*Source:* Author's elaboration based on World Development Indicators (World Bank, 2016a).

**Figure 12 Time required to export**



*Source:* Author's elaboration based on World Development Indicators (World Bank, 2016a).

## 2.4 Globalization and the role of China

The recent wave of globalization from 1980 onwards has brought with it opportunities as well as threats for both developed and particularly for developing countries. Although economists such as Stiglitz (2001), Rodrik (2011) and Wade (1990), amongst others, have always been cautious about the benefits of globalization, it was on the whole seen as a force for good, benefitting countries that take a more active role in trade within the globalized setting. More recently, however, an increasing number of economists and policymakers have begun questioning the view that globalization has an overwhelmingly positive impact on development (Fleno & Ponte, 2017). Some of the recent policy announcements by the present US

Administration, and the British government's decision to exit the EU, for example, are connected to the unease about certain aspects of globalization.

Controversies about the negative aspects of globalization on some developing countries emerged with the entry of China onto the globalized world stage. China's effective participation in international trade since 1980, combined with the fragmentation of production brought about by global value chains and the increased mobility of capital, portfolio investment and foreign direct investment (FDI), are argued to have had a negative impact on the industrial development of a number of countries. This impact is especially noticeable for those countries with a lower level of development as measured by income or industrial capacity, leading to de-industrialization<sup>4</sup> in certain cases<sup>5</sup>. The argument put forward in support of the de-industrialization hypothesis is that the level of competitiveness of China (and to some extent India) in supplying relatively simple/low-tech products internationally has increased competition in international markets for a number of developing countries with the same level of industrial competency, leading in some cases to the exit of competing firms from selected industries in some developing countries. In addition to the higher level of competition in international markets, China's impact on local producers is argued to have increased the costs of inputs due to much higher demand for these by China and others, as well as a relocation of FDI from competing developing economies to China.

There is anecdotal evidence to support this hypothesis; the scoping study published by the African Economic Research Consortium (2009) (cited in Jenkins, 2016) claims that a number of African textile and garment producers, in particular, were displaced by competition from Chinese imports. Summary data on the share of manufacturing value added as a percentage of GDP presented in Table 5<sup>6</sup>, together with the MVA trend over the period 1990-2015 for different development indicators illustrated in Figures 13 and 14, seem to provide some credence to this claim. For both development classifications, one based on income level and the other on level of industrial development, China's effective engagement in international trade seems to have had a negative impact on the share of MVA in GDP, indicating a certain level of de-industrialization. Similar information based on a time series is illustrated in Figure 12 for the low and low middle income category and Figure 13 for LDCs and EIE, excluding China; the declining trend in the share of MVA is more pronounced for the LI and LDC group for each

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<sup>4</sup> For further details on this issue and its classification, see F. Tregenna (2016).

<sup>5</sup> This is a controversial issue that is discussed in Kaplinsky and Morris (2008) and Jenkins (2016), amongst others.

<sup>6</sup> Two data points are presented in this table, the starting point relates to data for the respective indicators for the year 1990 and the end point to similar data for the year 2015.

respective category. The driving force behind the increased share of MVA in GDP in each case is the category that includes China. In the case of East Asia, amongst other factors, the increased share of MVA in GDP is mainly explained by heavier interaction with China in manufacturing production through global value chains. In the process, East Asian economies seem to have benefited industrially, but not to the extent China has<sup>7</sup>.

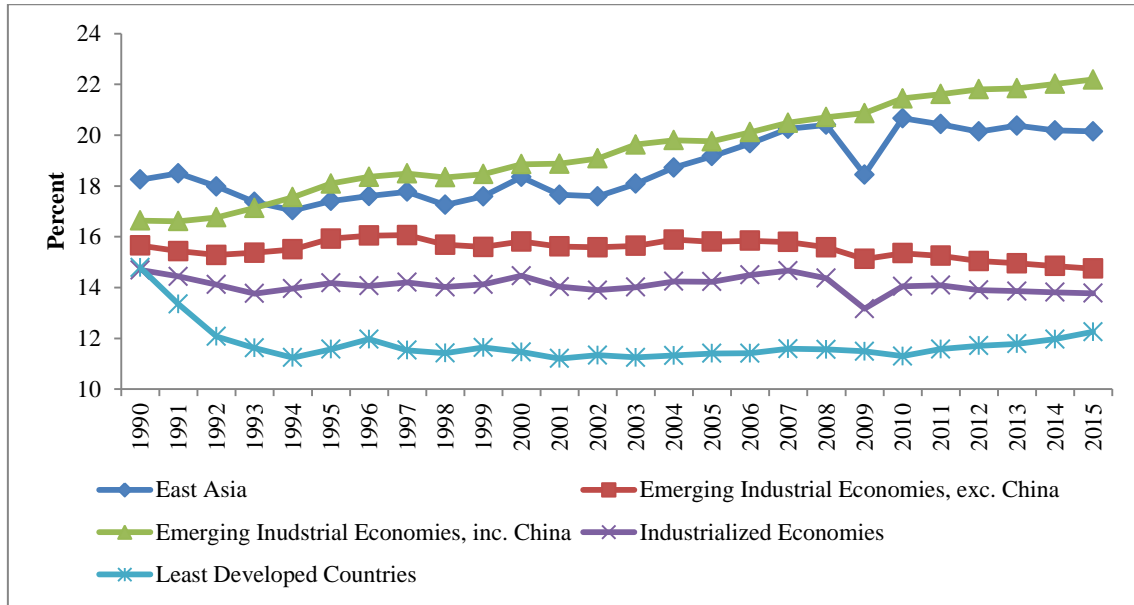
**Table 4** Manufacturing value added and GDP per capita by country group

	Year	GDP per capita (Constant 2010 US\$)	Manufacturing valued added (% of GDP)
Classification in terms of industrial development			
East Asia	1990	25032	18.2
	2015	34039	20.1
Emerging Industrial Economies, excl. China	1990	3067	15.7
	2015	5088	14.7
Emerging Industrial Economies, incl. China	1990	2118	16.6
	2015	5483	22.2
Industrialized Economies	1990	27735	14.7
	2015	39255	13.8
Least Developed Countries	1990	431	14.8
	2015	754	12.3
Classification in terms of Income			
Low Income	1990	447	18.2
	2015	710	13.0
Lower Middle Income, including China	1990	1012	15.1
	2015	2126	14.9
Lower Middle Income, excluding China	1990	6229	16.0
	2015	9003	14.0
Upper Middle Income	1990	3137	16.9
	2015	7475	22.4
High Income	1990	29684	14.4
	2015	41831	13.7

*Source:* Author's elaboration based on the Manufacturing Value Added database (UNIDO, 2016a).

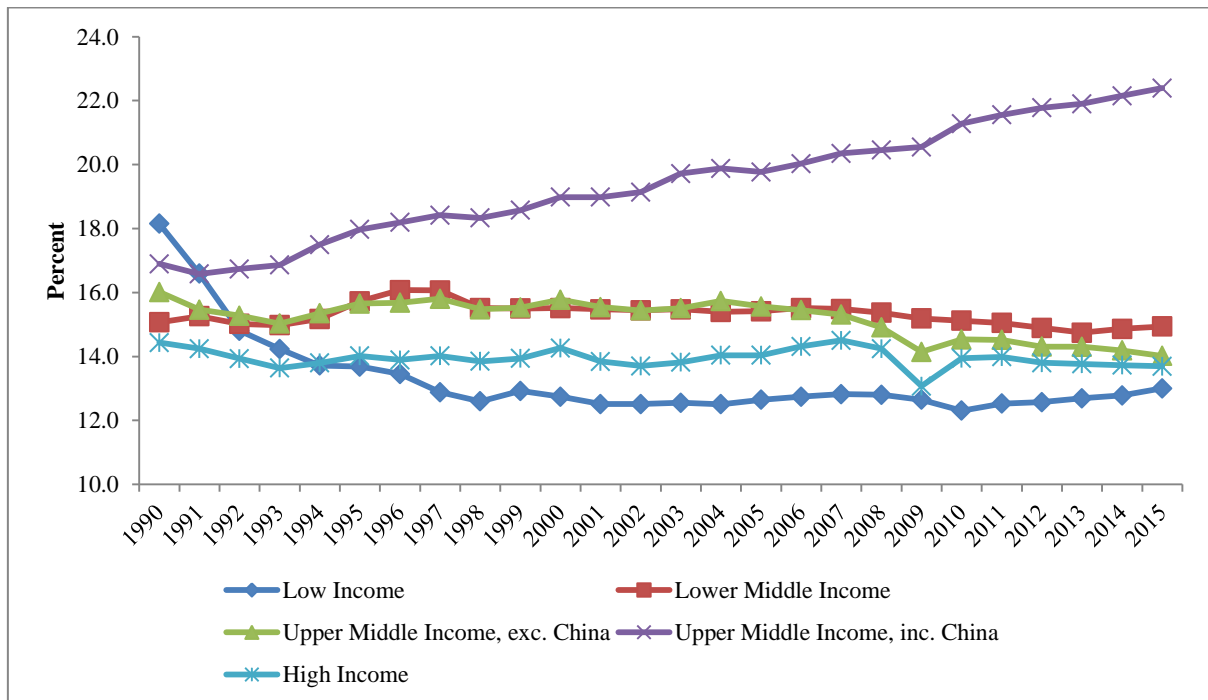
<sup>7</sup> This is to be expected given China's much lower level of development measured by GDP per capita, and the higher speed of catching up in China.

**Figure 13** Share of manufacturing value added in GDP by industrialization level



Source: Author's elaboration based on the Manufacturing Value Added database (UNIDO, 2016a).

**Figure 14** Share of manufacturing value added in GDP by income group



Source: Author's elaboration based on the Manufacturing Value Added database (UNIDO, 2016a).

A substantial increase in global value chains (GVCs) has also been suggested to have had detrimental effects on LDCs. As argued by Flento and Ponte (2017), in order to be able to benefit from fast moving global trade and increasing its share through GVCs, LDCs need to develop their own industrial capabilities, otherwise they may not benefit much, if at all, from increased trade generated by GVCs.

## **2.5 Summary**

By looking at the extent and composition of trade as well as policies related to tariff changes over time, it becomes clear that trade has increased considerably over the period 1960-2015, and particularly with the new wave of globalization, which started in the early 1980s, developing countries have also become more actively involved in this process. The picture that emerges when looking at various components of trade and trade policy, despite being incomplete, is that countries' industrial capability is directly linked to their status of development as measured by their income level, and that this link is strengthened by more active participation in international trade. A clearer picture will emerge if we look at the technological content of trade based on the available data for a selected number of countries; the next section will deal with this aspect.

## **3 Empirical analysis**

In addition to the descriptive analysis of the aggregate data presented above, the 2-digit ISIC level of the manufacturing sector based on the collected data allows us to delve deeper into the analysis of different country groups' industrial capacity. Sub-sectoral data that is available for 23 manufacturing divisions allows us to differentiate between countries in terms of their technological content and the factors accounting for it. In addition, by applying a simple demand decomposition method, we are able to distinguish between internal and external sources of demand and their contribution to the industrial capacity of these countries and country categories.

Table 6 summarizes the classification of manufacturing industries (divisions 15 to 37) in terms of their technological content according to UNIDO and EORA<sup>8</sup>. The manufacturing industries are classified as low-technology (LT), medium low-technology (MLT) and medium high- to high-technology (MHHT). Low-technology divisions broadly cover agriculture and resource-based, as well as labour intensive manufacturing activities. Medium low-technology divisions refer to more capital and scale intensive activities, while the medium high- to high-technology divisions are those engaged in knowledge-based activities. Using UNIDO's classification,

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<sup>8</sup> For details on construction and classification, see Lenzen et al. (2013).

countries are also classified according to their level of development, measured by their income or industrial technology.

### 3.1 Database

Two databases are used for the analysis; one is used for the descriptive analysis and the other for the decomposition analysis. The reasons for using two different databases are data coverage and availability.

For the descriptive analysis, the database constructed is based on a number of different sources. Industrial classification is based on UNIDO's INDSTAT 2, ISIC 2016 revision 3 database. The comparative data on trade at the 2-digit level ISIC is based on the Comtrade database and extracted from World Integrated Trade Solution (WITS)<sup>9</sup>. Additional data used are extracted from the World Bank's World Development Indicators. For the decomposition analysis, data coverage for developing countries, particularly those at the lower levels of development, is very poor and we therefore rely on the Input-Output data generated by Eora<sup>10</sup>. This provides us with a total of 155 countries, composed of a relatively balanced number of different country groups based on the classifications used. Table 7 lists all the countries included in our dataset for the decomposition analysis. To smooth the data and to consider changes over a longer period, we have generated two data points for each country, one being the average of 1990-94 and the second based on the average for 2010-2013. Differences between the two observations would then provide the rate of change of the relevant variables over a period of approximately 20 years<sup>11</sup>.

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<sup>9</sup> Available at: <http://wits.worldbank.org/>.

<sup>10</sup> Available at <http://worldmrio.com/>. Under the Questions? heading of the site, read the PDF document on "Uncertainty and Reliability in the Eora MRIO Tables" which discusses a number of issues relating to the reliability of the data generated.

<sup>11</sup> Given the small number of countries in the lower income categories, however, the unexpected annual changes would still affect the average data for the group and therefore, a comparative analysis could be misleading.

**Table 5 Technology classification of manufacturing sub-sectors**

Division	Product	Classification <sup>12</sup>	
		UNIDO	EORA
15	Manufacture of food products and beverages	LT	EORA_4
16	Manufacture of tobacco products	LT	EORA_4
17	Manufacture of textiles	LT	EORA_5
18	Manufacture of wearing apparel; dressing and dyeing	LT	EORA_5
19	Tanning and dressing of leather; manufacture of luggage, handbag, saddlery, harness and footwear	LT	EORA_5
20	Manufacture of wood and of products	LT	EORA_6
21	Manufacture of paper and paper products	LT	EORA_6
22	Publishing, printing and reproduction of recorded media	LT	EORA_6
23	Manufacture of coke, refined petroleum products and nuclear fuel	MLT	EORA_7
24	Manufacture of chemicals and chemical products	MHHT	EORA_7
25	Manufacture of rubber and plastics products	MLT	EORA_7
26	Manufacture of other non-metallic mineral products	MLT	EORA_7
27	Manufacture of basic metals	MLT	EORA_8
28	Manufacture of fabricated metal products, except machinery and equipment	MLT	EORA_8
29	Manufacture of machinery and equipment	MHHT	EORA_9
30	Manufacture of office, accounting and computing machinery	MHHT	EORA_9
31	Manufacture of electrical machinery and apparatus	MHHT	EORA_9
32	Manufacture of radio, television and communication equipment and apparatus	MHHT	EORA_9
33	Manufacture of medical, precision and optical	MHHT	EORA_9
34	Manufacture of motor vehicles, trailers and	MHHT	EORA_10
35	Manufacture of other transport equipment	MHHT	EORA_10
36	Manufacture of furniture; manufacturing n.e.c.	LT	EORA_11
37	Recycling	LT	EORA_12

<sup>12</sup> Classifications are based on two different sources, UNIDO and EORA. For UNIDO, the divisions are divided into three different technology groups: Low technology (LT), Medium low technology (MLT) and MHHT (medium high and high technology). EORA, on the other hand, classifies manufacturing into nine different groups. Each of UNIDO's classifications contains a number of different EORA groups: LT is composed of EORA sectors 4, 5, 6 11 and 12; MLT mostly of 7 and 8 (subsector 24 is in fact MHHT, but is included in MLT in this case); and MHHT consists of EORA 9 and 8, but without subsector 24). The analysis that follows uses UNIDIO's classifications with the difference that subsector 24 is included in MLT in this case.

**Table 6 Income and industrial capability classification of countries**

**All countries:** Afghanistan, Albania, Algeria, Angola, Argentina, Australia, Austria, Azerbaijan, Bahrain, Bangladesh, Belarus, Belgium, Benin, Bhutan, Bolivia, Bosnia and Herzegovina, Botswana, Brazil, Bulgaria, Burkina Faso, Burundi, Cambodia, Cameroon, Canada, Cape Verde, Central African Republic, Chad, Chile, China, Colombia, Congo, Costa Rica, Côte d'Ivoire, Croatia, Cyprus, Czechia, Denmark, Djibouti, Dominican Republic, DPR of Korea, DR Congo, Ecuador, Egypt, El Salvador, Estonia, Fiji, Finland, France, Gabon, Gambia, Georgia, Germany, Ghana, Greece, Guatemala, Guinea, Guyana, Haiti, Honduras, Hong Kong SAR, Hungary, India, Indonesia, Iran, Iraq, Ireland, Israel, Italy, Jamaica, Japan, Jordan, Kenya, Kuwait, Kyrgyzstan, Laos, Latvia, Lebanon, Lesotho, Liberia, Libya, Lithuania, Luxembourg, Macao SAR, Madagascar, Malawi, Malaysia, Mali, Mauritania, Mauritius, Mexico, Moldova, Mongolia, Montenegro, Morocco, Mozambique, Myanmar, Namibia, Nepal, Netherlands, New Zealand, Nicaragua, Niger, Nigeria, Norway, Oman, Pakistan, Panama, Papua New Guinea, Paraguay, Peru, Philippines, Poland, Portugal, Qatar, Republic of Korea, Romania, Russian Federation, Rwanda, Saudi Arabia, Senegal, Serbia, Sierra Leone, Singapore, Slovakia, Slovenia, Somalia, South Africa, Spain, Sri Lanka, Sudan, Suriname, Swaziland, Sweden, Switzerland, Syria, Taiwan ROC, Tajikistan, Tanzania, TFYR Macedonia, Thailand, Togo, Trinidad and Tobago, Tunisia, Turkey, Turkmenistan, UAE, Uganda, United Kingdom, Ukraine, Uruguay, United States of America, Uzbekistan, Venezuela, Viet Nam, Yemen, Zambia.

**Classified according to income level:**

**Low income:** Afghanistan, Bangladesh, Benin, Burkina Faso, Burundi, Cambodia, Central African Republic, Chad, Congo, DPR of Korea, DR Congo, Eritrea, Ethiopia, Gambia, Guinea, Haiti, Kenya, Liberia, Madagascar, Malawi, Mali, Mozambique, Myanmar, Nepal, Niger, , Rwanda, Sierra Leone, Somalia, Tajikistan, Tanzania, Togo, Uganda, Zimbabwe.

**Low Middle Income:** Bhutan, Bolivia, Cameroon, Cape Verde, Côte d'Ivoire, Djibouti, Egypt, El Salvador, Georgia, Ghana, Guatemala, Guyana, Honduras, India, Indonesia, Kyrgyzstan, Laos, Lesotho, Mauritania, Moldova, Mongolia, Morocco, Nicaragua, Nigeria, Pakistan, Papua New Guinea, Paraguay, Philippines, Senegal, Sri Lanka, Sudan, Swaziland, Syria, Ukraine, Uzbekistan, Viet Nam, Yemen, Zambia.

**Upper Middle Income:** Albania, Algeria, Angola, Argentina, Azerbaijan, Belarus, Bosnia and Herzegovina, Botswana, Brazil, Bulgaria, China, Colombia, Costa Rica, Dominican Republic, Ecuador, Fiji, Gabon, Hungary, Iran, Iraq, Jamaica, Jordan, Lebanon, Libya, Malaysia, Mauritius, Mexico, Montenegro, Namibia, Panama, Peru, Romania, Serbia, South Africa, Suriname, TFYR Macedonia, Thailand, Tunisia, Turkey, Turkmenistan, Venezuela.



**High Income:** Australia, Austria, Bahrain, Belgium, Canada, Chile, Croatia, Cyprus, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hong Kong SAR, Ireland, Israel, Italy, Japan, Kuwait, Latvia, Lithuania, Luxembourg, Macao SAR, Netherlands, New Zealand, Norway, Oman, Poland, Portugal, Qatar, Republic of Korea, Russian Federation, Saudi Arabia, Singapore, Slovakia, Slovenia, Spain, Sweden, Switzerland, Taiwan ROC, Trinidad and Tobago, UAE, United Kingdom, Uruguay, United States of America.

**Classified according to industrial capability:**

**Least Developed Countries:** Afghanistan, Bangladesh, Benin, Bhutan, Burkina Faso, Burundi, Cambodia, Central African Republic, Chad, Djibouti, DR Congo, Gambia, Guinea, Haiti, Laos, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritania, Mozambique, Myanmar, Nepal, Niger, Rwanda, Senegal, Sierra Leone, Somalia, Sudan, Tanzania, Togo, Uganda, Yemen, Zambia.

**Other Developing Economies:** Albania, Algeria, Angola, Azerbaijan, Bolivia, Bosnia and Herzegovina, Botswana, Cameroon, Cape Verde, Congo, Côte d'Ivoire, Dominican Republic, Ecuador, Egypt, El Salvador, Fiji, Gabon, Georgia, Ghana, Guatemala, Guyana, Honduras, Iran, Iraq, Jamaica, Jordan, Kenya, Kyrgyzstan, Lebanon, Libya, Moldova, Mongolia, Montenegro, Morocco, Namibia, Nicaragua, Nigeria, Pakistan, Panama, Papua New Guinea, Paraguay, Peru, Philippines, Sri Lanka, Swaziland, Syria, Tajikistan, Trinidad and Tobago, Turkmenistan, Uzbekistan, Viet Nam.

**Emerging Industrial Economies:** Argentina, Belarus, Brazil, Bulgaria, Chile, China, Colombia, Costa Rica, Croatia, Cyprus, Greece, India, Indonesia, Latvia, Mauritius, Mexico, Oman, Poland, Romania, Saudi Arabia, Serbia, South Africa, Suriname, TFYR Macedonia, Thailand, Tunisia, Turkey, Ukraine, Uruguay, Venezuela.

**Industrialized Economies:** Australia, Austria, Bahrain, Belgium, Canada, Czechia, Denmark, Estonia, Finland, France, Germany, Hong Kong SAR, Hungary, Ireland, Israel, Italy, Japan, Kuwait, Lithuania, Luxembourg, Macao SAR, Malaysia, Netherlands, New Zealand, Norway, Portugal, Qatar, Republic of Korea, Russian Federation, Singapore, Slovakia, Slovenia, Spain, Sweden, Switzerland, Taiwan ROC, UAE, United Kingdom, United States of America.

### **3.2 Descriptive analysis**

Data presented here are based on UNIDO's technology classifications of countries' manufacturing sectors, which allows us to differentiate between the industrial capabilities of different countries/groups of countries, and the role internal and external demand plays in the countries' development over time. Similar data based on EU KLEMS and EORA classifications are presented in Tables 18 and 19.

Summary data of selected indicators of development presented in Tables 8 and 9 suggest an increase in the share of gross fixed capital in GDP between the two periods, except in the case of the high income group; it is not surprising that the GDP per capita for the two different categories of development has increased for all country groups. No particular trend is visible in terms of the technological content of different sub-sectors (LT, MHT and MHHT), though the total share of MVA as a percentage of manufactures output and GDP for different development criteria indicates a drop in 2010-15 relative to the period 1991-96. This drop applies to most of the subsector products for all country groups.

**Table 7 Summary data on selected indicators of industrial capabilities based on income classification**

	Periods	GDPPC <sup>(1)</sup>	GFCF <sup>(2)</sup>	Value added as % output				Value added as % of GDP			
				LT	MLT	MHHT	Total	LT	MLT	MHHT	Total
<b>Overall Average</b>	1991-96	14431	22	34	34	35	35	7	4	5	16
	2010-15	21092	23	29	26	31	28	4	3	4	11
<b>Low Income</b>	1991-96	814	18	42	27	26	38	7	1	1	9
	2010-15	921	23	26	26	29	26	4	1	1	6
<b>Low Middle Income</b>	1991-96	1337	21	31	30	32	33	7	3	3	13
	2010-15	2165	23	30	28	34	31	6	3	3	11
<b>Upper Middle Income</b>	1991-96	4092	22	33	34	33	34	8	4	5	18
	2010-15	7068	26	32	27	31	29	5	3	3	12
<b>High Income</b>	1991-96	16537	23	34	34	36	35	7	4	5	17

*Notes:* 1: GDP per capita, constant 2010 US\$. 2: gross fixed capital investment as a percentage of GDP.

*Source:* Author's elaboration based on World Development Indicators (World Bank, 2016a).

**Table 8 Summary data on selected indicators of industrial capabilities based on industrial technology classification**

	Periods	GDPPC <sup>(1)</sup>	GFCF <sup>(2)</sup>	Value added as % output				Value added as % of GDP			
				LT	MLT	MHHT	Total	LT	MLT	MHHT	Total
<b>Overall Average</b>	1991-96	14431	22	34	34	35	35	7	4	5	16
	2010-15	21092	23	29	26	31	28	4	3	4	11
<b>Least Developed Countries</b>	1991-96	792	18	40	27	30	37	6	1	1	9
	2010-15	970	21	27	29	30	27	6	2	1	9
<b>Other Developing Countries</b>	1991-96	1931	20	33	32	30	34	7	4	2	13
	2010-15	3699	25	33	27	34	32	6	3	2	11
<b>Emerging Industrial Economies</b>	1991-96	6024	21	35	36	37	36	9	4	4	18
	2010-15	9467	25	30	28	33	29	5	3	3	10
<b>Industrialized Economies</b>	1991-96	26384	24	34	35	35	34	7	4	7	18
	2010-15	37949	21	28	24	29	26	3	3	6	13

*Notes:* 1: GDP per capita, constant 2010 US\$. 2: Gross fixed capital investment as percentage of GDP.

*Source:* Author's elaboration based on World Development Indicators (World Bank, 2016a).

Considering the share of value added for different industries as a percentage of GDP paints a different picture. The value added of the low income group, although decreasing over time, was concentrated in activities with a low technological content and that of high income countries in products with a high technological content<sup>13</sup>. The technological content of products in other income groups was more diverse. A similar picture emerges when considering countries' industrial classification.

The international capability of countries in terms of industrial technology for different subsectors (LT, MLT and MHHT) is expected to be more accurately reflected through trade and particularly through the export of products<sup>14</sup>. Tables 10 and 11 provide summary data on the import and export of different product classifications for the group of countries in our dataset<sup>15</sup>.

**Table 9** Summary data on imports and exports of manufacturing goods from subsectors based on income classification

		<i>Import as % of output</i>				<i>Export as % of output</i>			
	<b>Period</b>	<i>LT</i>	<i>MLT</i>	<i>MHHT</i>	<i>Total</i>	<i>LT</i>	<i>MLT</i>	<i>MHHT</i>	<i>Total</i>
<b><i>Overall Average</i></b>	1991-96	42	68	274	66	37	31	70	42
	2010-14	84	154	456	142	49	79	143	72
<b><i>Low Income</i></b>	1991-96	49	182	330	107	18	8	22	17
	2010-14	43	378	741	124	20	71	36	25
<b><i>Low Middle Income</i></b>	1991-96	21	54	257	45	37	21	71	37
	2010-14	34	106	422	82	37	24	48	37
<b><i>Upper Middle Income</i></b>	1991-96	45	52	508	68	32	26	47	35
	2010-14	55	132	413	109	34	86	78	50
<b><i>High Income</i></b>	1991-96	47	70	180	69	42	37	83	49
	2010-14	119	152	466	182	64	93	211	97

Source: Author's elaboration based on the INDSTAT 2 ISIC, Rev. 3. Database (UNIDO, 2016b) and World Bank (2016b).

<sup>13</sup> For the low income group, for example, the share of MVA in GDP in 2010-15 was 4 per cent for LT, 1 per cent each for MLT and MHHT. For the high income group, the share is 3 per cent each for LT and MLT and 6 per cent for MHHT.

<sup>14</sup> See Hausmann et al. (2011).

<sup>15</sup> Given the data issues for a number of countries for the year 2015, the average data for the end period is based on 2010-2014.

**Table 10** Summary data on imports and exports of manufactured products from subsectors based on industrial technology classification

		<i>Import as % of output</i>				<i>Export as % of output</i>			
	<b>Period</b>	<i>LT</i>	<i>MLT</i>	<i>MHHT</i>	<i>Total</i>	<i>LT</i>	<i>MLT</i>	<i>MHHT</i>	<i>Total</i>
<b><i>Overall Average</i></b>	1991-96	42	68	274	66	37	31	70	42
	2010-14	84	154	456	142	49	79	143	72
<b><i>Least Developed Countries</i></b>	1991-96	42	156	271	90	24	8	17	17
	2010-14	42	337	816	112	26	69	34	28
<b><i>Other Developing Countries</i></b>	1991-96	54	59	867	82	39	17	90	38
	2010-14	67	132	627	136	37	29	59	40
<b><i>Emerging Industrial Economies</i></b>	1991-96	34	68	230	59	32	32	65	35
	2010-14	46	124	241	88	38	90	85	53
<b><i>Industrialised Economies</i></b>	1991-96	44	61	127	64	42	36	74	50
	2010-14	122	150	473	186	64	94	223	100

*Source:* Author's elaboration based on the INDSTAT 2 ISIC, Rev. 3. Database (UNIDO, 2016b) and World Bank (2016b).

On average, the dependence of all country groups on imports from different industries has increased over the entire period, this increase being particularly noticeable for MLT and MHHT products. In terms of income classification, the dependence of low income groups on LT imports (as a percentage of output) declined (from 49 per cent to 42 per cent), but increased considerably (nearly double) for MLT and MHHT products. For other countries, the share of imports in output of all subsector imports increased (and at times considerably). Similarly, as shown in Table 11, the same picture emerges when we consider country classifications in terms of industrial technology.

Looking at the share of exports in output, we see an increase for all subsector classifications between the two periods; the increase is more pronounced for MLT and MHHT products, which nearly doubled over the period. Considering different income classifications, the low income group had a relatively low share of exports in all categories for different periods, despite registering increases for all subsectors in the second period, especially for MLT. The overall share of exports of low middle income countries remained stable over the two periods, although the subsector shares for MLT and MHHT changed, increasing for the former and decreasing for the latter. As far as the upper middle income group is concerned, the overall share of exports has gone up by 15 per cent; this is mainly due to the increase in the share of exports in MLT products, in particular, as well as in MHHT. The share of exports in output for the high income

group indicated an increase of around 100 per cent; most of the increase was attributable to the export of MLT and MHHT. When looking at the classification of countries in accordance with their level of industrial technology as shown in Table 11, a similar picture emerges.

The descriptive analysis conducted here suggests that countries generally export manufactured products based on their industrial capability; those with a low level of capability as classified by their level of income or industrial technology export goods with a relatively low technological content while those with a higher level of competencies export products that contain a higher level of technological content. To verify this broad conclusion, Tables 12 and 13<sup>16</sup> present data on export growth as well as on net exports for different country groups<sup>17</sup>.

**Table 11** Summary data on export growth and net exports with different technological contents based on income classification

	<i>Periods</i>	<i>Export growth</i>				<i>Net Export over output</i>			
		<i>LT</i>	<i>MLT</i>	<i>MHHT</i>	<i>Total</i>	<i>LT</i>	<i>MLT</i>	<i>MHHT</i>	<i>Total</i>
		<b>Income Classification</b>							
<b>Overall Average</b>	1991-96					-5	-35	-192	-23
	2010-15	0.6	2.0	2.0	0.9	-28	-62	-261	-58
<b>Low Income</b>	1991-96					-36	-156	-227	-94
	2010-15	6.4	10.5	5.0	2.1	-22	-351	-719	-96
<b>Low Middle Income</b>	1991-96					16	-30	-186	-9
	2010-15	0.2	0.9	3.2	0.3	5	-68	-214	-37
<b>Upper Middle Income</b>	1991-96					-13	-27	-441	-31
	2010-15	0.2	2.8	1.3	0.9	-15	-46	-204	-44
<b>High Income</b>	1991-96					-5	-33	-97	-20
	2010-15	0.6	1.5	1.9	0.9	-44	-38	-255	-66

*Notes:* (1) Calculation of both growth and net export is based on the average data for the two periods. Canada is excluded from the calculation of export growth because the country's export share/growth is unusually high, substantially affecting the averages calculated for the group Canada belongs to.

*Source:* Author's elaboration based on the INDSTAT 2 ISIC, Rev. 3. Database (UNIDO, 2016b) and World Bank (2016b).

<sup>16</sup> Note that due to non-availability of data for different countries over different periods, the rates of growth calculations reported in the table may be based on a smaller number of countries for different categories and the results may therefore not be compatible with the data provided in Table (9). One way we could have avoided this problem is if we had dropped countries with incomplete data for the two periods. This, however, would have led to a much reduced number of countries, particularly those with a lower income/lower level of industrial technology and make the dataset even less balanced.

<sup>17</sup> As already discussed, a country's industrial capabilities are linked to a number of demand-pull and supply-push factors, some of which were discussed above in the context of broader country classifications, and data on these were presented in Tables (1)-(4). The discussion that follows here adds an analysis which is based on sub-sectoral data available for the countries in our dataset.

**Table 12** Summary data on export growth and net exports of different technology levels based on industrial technology classification

	<i>Periods</i>	<i>Export growth</i>				<i>Net Export over output</i>			
		<i>LT</i>	<i>MLT</i>	<i>MHHT</i>	<i>Total</i>	<i>LT</i>	<i>MLT</i>	<i>MHHT</i>	<i>Total</i>
<b>Overall Average</b>	1991-96					-5	-35	-192	-23
	2010-15	0.6	2.0	2.0	0.9	-28	-62	-261	-58
<b>Least Developed Countries</b>	1991-96					-20	-156	-181	-94
	2010-15	4.4	10.5	3.2	2.1	-15	-287	-614	-80
<b>Other Developing Countries</b>	1991-96					-16	-42	-783	-43
	2010-15	0.1	0.9	3.5	0.4	-21	-102	-358	-77
<b>Emerging Industrial Economies</b>	1991-96					-2	-36	-165	-24
	2010-15	0.3	2.5	1.5	0.9	-7	-34	-156	-34
<b>Industrialized Economies</b>	1991-96					-2	-25	-54	-14
	2010-15	0.6	1.6	1.9	0.9	-45	-32	-250	-64

*Notes:* (1) The calculation of both growth and net export is based on the average data for the two periods. Canada is excluded from the calculation of export growth because the country's export share/growth is unusually high, substantially affecting the averages calculated for the group Canada belongs to.

*Source:* Author's elaboration based on the INDSTAT 2 ISIC, Rev. 3. Database (UNIDO, 2016b) and World Bank (2016b).

The average data suggests that the rate of export growth has increased over the entire period. A rise in the net export of MLT and MHHT products is evident, both increasing about two-fold. In total, the export of all category products has gone up by an average of over 90 per cent. The net export ratio, however, is negative and has further deteriorated for all categories, at the same time signifying higher dependence on imports<sup>18</sup>. This is possibly an indication that the import content of some of the products exported may have increased. In the context of globalization and global value chains which have spread significantly during the entire period, this is an issue that should be taken into account<sup>19</sup>. As far as the situation for different income groups is concerned, the low income group recorded the largest export growth for all subsector products; on average, exports have more than doubled for this group over the entire period. At the same time, however, the deterioration in their net export ratio was highest for MLT and MHHT; LT import dependency declined. Export growth in this case seems to have been partly driven by increased imports of

<sup>18</sup> This cannot be true for the world economy since imports by one group are the exports by another. In this case, however, we only have data for 72 countries and the general condition stated above would therefore not hold.

<sup>19</sup> An example of this, as discussed in Kaplinsky (2016:185), is the Apple iPhone 4. Exported from China at the unit price of US\$ 179, China's value added was only US\$ 6.50. The balance consisted of components imported from other countries, including the Republic of Korea, the US and Germany.



similar subsector products. Low middle and upper middle income groups also experienced high export growth, particularly for MHHT in the case of lower middle income and MLT for the upper middle income groups. At the same time, the import dependence of the lower middle income group on imports of similar subsector products rose whereas dependence on MLT has climbed and fallen for MHHT. The high income group registered an average growth rate of over 90 per cent in total, accounted for by the high growth in MHHT, MLT and LT. Import dependence on similar subsector products also increased, considerably in the case of MHHT and LT, albeit starting from a low dependence. A similar picture emerges when looking at the developments in exports and net exports based on the classification of countries in terms of the level of their industrial technology.

### 3.3 Demand decomposition

Decomposition analysis is one way of identifying the role external and internal sources of demand have had on the industrial development of a country/ groups of countries. A decomposition analysis differentiates between the rise of internal demand for various industrial products, holding the share of imports constant; the rise in exports of the goods in question; and the increase in import substitution, which affects the share of imports. The sum of the growth rates for each product category is equal to the change in domestic output. This is written as follows:

$$\Delta P = d_1 * (\Delta P + \Delta M - \Delta X) + (d_2 - d_1) * (P_2 + M_2 - X_2) + \Delta X \quad (1)$$

'P' represents domestic output, 'M' denotes imports, 'X' exports, 'Δ' stands for the rate of change in the variables between time periods '1' and '2' (the time periods can be annual or otherwise),. 'd' denotes (1-m), where 'm' is the share of imports in apparent consumption. Apparent consumption is the sum of domestic production, plus imports, minus exports (P+M-X), calculated for each industrial product.

Dividing the specification in (1) by 'ΔP' would give us the rates of growth referred to above. Growth in domestic demand is given by  $d_1 * (\Delta P + \Delta M - \Delta X) / \Delta P$ ; import substitution by  $(d_2 - d_1) * (P_2 + M_2 - X_2) / \Delta P$ ; and export growth by  $\Delta X / \Delta P$ . The scope of these changes provides an indication of the direction of change of demand growth and the contribution each makes to the overall change in total output. For a growing economy, the expectation is that demand and export growth would be rising between the two periods, while changes in import substitution could be either negative or positive; a negative change in import substitution indicates, that the country relies more on importing the given product than sourcing it domestically. Importing rather than domestically sourcing the product may either be policy and/or efficiency driven.

Trade liberalization and the reduction in tariff and non-tariff barriers, for example, leads to increased imports. Similarly, in an economy where trade flows fairly freely, a change in the relative prices of goods on the grounds of efficiency/competition may lead to increased imports, if local producers cannot compete with their external competitors.

Data gathered on relevant variables at the 2-digit ISIC level for the countries in our dataset allows us to conduct a decomposition analysis, the results of which are presented in Tables 14-17. Tables 16 and 17 report results based on the elimination of a number of countries<sup>20</sup> from the analysis due to extreme data movements. The results are therefore more reliable in terms of average results; the analysis that follows is based on this table.

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<sup>20</sup> These are: Canada, Kenya, TFYR Macedonia, Malawi, Malta, Panama, Romania, Singapore, Slovakia and United Kingdom.

**Table 13 Demand decomposition for manufacturing subsectors based on income classification**

	Domestic demand growth				Export growth				Import substitution			
	LT	MLT	MHHT	Total	LT	MLT	MHHT	Total	LT	MLT	MHHT	Total
<b>Overall average</b>	91	43	43	41	42	81	16	66	-33	-24	40	-8
<b>Low Income</b>	168	75	69	100	-82	-119	76	14	14	145	-45	-14
<b>Low Middle Income</b>	85	46	65	-51	38	-14	51	8	-22	67	-17	143
<b>Upper Middle Income</b>	82	75	91	62	-73	35	50	32	91	-10	-41	6
<b>High Income</b>	91	24	13	50	105	144	-14	101	-95	-69	101	-51

**Table 14 Demand decomposition for manufacturing subsectors based on industrial technology classification**

	Domestic demand growth				Export growth				Import substitution			
	LT	MLT	MHHT	Total	LT	MLT	MHHT	Total	LT	MLT	MHHT	Total
<b>Overall average</b>	91	43	43	41	42	81	16	66	-33	-24	40	-8
<b>Least Developed Countries</b>	140	75	104	100	-48	-119	60	14	9	145	-64	-14
<b>Other Developing Countries</b>	77	21	89	-46	-156	-16	73	-20	178	95	-61	166
<b>Emerging Industrial Economies</b>	96	62	70	79	38	36	-2	83	-33	2	31	-62
<b>Industrial Economies</b>	87	35	5	41	117	160	3	89	-104	-95	92	-29

**Table 15 Demand decomposition for manufacturing subsectors based on income classification (1)**

	Domestic demand growth				Export growth				Import substitution			
	LT	MLT	MHHT	Total	LT	MLT	MHHT	Total	LT	MLT	MHHT	Total
<b>Overall average</b>	73	58	51	65	49	47	85	74	-23	-5	-36	-39
<b>Low Income</b>	74	26	52	81	45	92	131	69	-19	-18	-83	-50
<b>Low Middle Income</b>	80	91	74	119	38	1	59	67	-18	9	-33	-86
<b>Upper Middle Income</b>	75	86	92	56	27	33	103	21	-2	-19	-95	23
<b>High Income</b>	71	40	27	53	62	62	82	99	-33	-2	-8	-52

*Notes:* (1) Because of unusual rates of changes, the following countries were excluded from the calculations reported: Canada, Kenya, TFYR Macedonia, Malawi, Malta, Panama, Romania, Singapore, Slovakia and United Kingdom.

**Table 16 Demand decomposition for manufacturing subsectors based on industrial technology classification (1)**

	Domestic demand growth				Export growth				Import substitution			
	LT	MLT	MHHT	Total	LT	MLT	MHHT	Total	LT	MLT	MHHT	Total
<b>Overall average</b>	73	58	51	65	49	47	85	74	-23	-5	-36	-39
<b>Least Developed Countries</b>	68	26	104	81	48	92	91	69	-16	-18	-95	-50
<b>Other Developing Countries</b>	67	77	100	109	43	3	118	67	-10	20	-118	-76
<b>Emerging Industrial Economies</b>	93	59	68	78	19	30	19	63	-12	11	12	-41
<b>Industrial Economies</b>	64	55	19	42	70	68	117	84	-34	-23	-36	-26

*Notes:* (1) Because of unusual rates of change, the following countries were excluded from the calculations: Canada, Kenya, TFYR Macedonia, Malawi, Malta, Panama, Romania, Singapore, Slovakia and United Kingdom.

On average, domestic demand growth seems to have been the dominant force in changing production for all technology categories, with the exception of MHHT; the export growth of MHHT was much larger than domestic demand growth over the period covered<sup>21</sup>, suggesting that growth in this subsector product is export driven. As for the different development categories used here, namely income and industrial technology, there are distinctions between different country groups. For the low income group, domestic demand growth for LT was much higher than that of exports. As expected, most countries are capable of producing this type of subsector product and changes in its output are domestic demand driven. In terms of import substitution, the growth rate for all categories was negative and high for MHHT, suggesting a larger reliance on imports of all technology categories, particularly MHHT products to satisfy internal demand. Domestic demand growth rates in the low middle income group were relatively high on average, and dominated that of export growth for all technology categories. The import substitution effect was negative for LT, positive but small for MLT and negative and large for MHHT. It appears that the lower middle income group had a comparative advantage in MLT products. In the case of the upper middle income group, both domestic demand and export growth rates for all product categories were positive and domestic demand growth dominated export growth for all technology categories, except MHHT, for which export growth was about twice as large. Import substitution is negative and rather small for LT and MLT, and large for MHHT, suggesting import dependency of this country group on more technology/knowledge-based products. For the high income group, the export growth for MLT and MHHT products was higher than domestic demand growth, suggesting more reliance on external demand for these products; the reverse holds for LT products. In terms of import substitution, all changes are negative and relatively small for MLT and MHHT products and larger for LT products, as expected, suggesting stronger reliance on imports that are labour intensive. Nearly the same picture emerges when looking at the results for country classification in terms of level of industrialization.

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<sup>21</sup> The reported rates of growth cover around 20 years, percentage change from the average for 1991-96 and 2000-15.

#### **4. Conclusion**

This study has examined the role of both internal and external demand in the development of the manufacturing sectors of a number of countries. An analysis conducted at the aggregate level suggests that internal and external demand plays a potentially important role in the development of an economy's manufacturing sector. Using subsectoral manufacturing data in terms of the technological content of goods produced for a number of countries at different levels of development, measured by income or level of industrial technology, and applying the demand decomposition technique, we were able to measure the contribution that domestic demand growth, export growth and changes in import substitution plays in changes in subsectoral outputs. The decomposition results on the whole suggest that domestic demand growth plays a larger role in changes in manufacturing output, particularly for less technologically demanding products. In the case of higher technology items, external demand seems to play a more prominent role. Changes in import substitution also follow the expectation that lower income/less developed economies import a larger share of their demand for more technologically demanding products and higher income/more developed economies rely more on imports of relatively simpler and labour intensive products.

The analysis conducted is based on data that has a number of limitations. Data availability and reliability at the 2-digit ISIC level for trade is one of those limitations, in particular. The number of countries included in the dataset, particularly at the lower income/less industrialized level is another one. To arrive at more solid conclusions about the nature and magnitude of external and internal demand requires more detailed information on the import content of products, information which at this stage is patchy, at best.

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## Annex

Table 17 Demand decomposition in terms of EU KLEMS and EORA, based on income classification

	EU KLEMS				EORA								
	MCons	MInter	MInves	ELECOM	EORA_4	EORA_5	EORA_6	EORA_7	EORA_8	EORA_9	EORA_10	EORA_11	EORA_12
<b>Domestic demand growth</b>													
<b>LI<sub>(1)</sub></b>	365	-113	22	90	230	-27	66	-602	-768	45	19	81	
<b>LMI</b>	112	360	-7	-37	102	-34	108	-507	164	-610	495	173	
<b>UMI</b>	53	91	39	-15	182	-99	77	96	-3240	99	-2573	33	46
<b>HI</b>	-248	196	340	87	-197	65	7	249	69	26	-13	78	106
<b>Export growth</b>													
<b>LI</b>	0.6	-0.4	-1.7	-0.4	0.4	-0.1	0.1	-1.9	-4.5	-0.6	1.8	0.1	
<b>LMI</b>	0.1	0.9	-0.5	-0.7	0.0	-0.2	0.0	-1.6	-31.5	-0.4	-0.1	0.1	-1.8
<b>UMI</b>	0.0	0.4	0.0	2.1	0.1	1.6	0.1	0.3	0.2	-0.8	-2.8	0.0	0.0
<b>HI</b>	4.4	0.3	0.6	-0.3	-0.3	-0.1	-0.1	0.3	0.0	0.7	-1.3	0.0	
<b>Import substitution</b>													
<b>LI</b>	-265.6	213.5	79.2	10.5	-130.7	127.0	34.1	703.9	872.6	55.5	83.6	19.3	
<b>LMI</b>	-11.6	-260.4	107.6	138.3	-1.8	134.5	-8.5	608.7	-64.0	712.2	-396.3	-73.1	
<b>UMI</b>	46.8	9.0	61.6	114.0	-82.3	199.8	23.2	4.2	3359.8	0.4	2676.8	66.8	55.6
<b>HI</b>	343.7	-96.8	-240.6	12.4	297.4	33.8	93.6	-149.1	30.9	72.9	114.6	22.0	-5.9

Notes: (1): LI= low income, LMI=low middle income, UMI=upper middle income and HI=high income.

Source: Author's elaboration based on the Eora Multi-Region Input-Output database (Lenzen et al. 2012; Lenzen et al. 2013) and the EU KLEMS database (O'Mahony and Timmer; 2009).

**Table 18 Demand decomposition in terms of EU KLEMS and EORA, based on industrial technology classification**

	EU KLEMS				EORA								
	MCons	MInter	MInves	ELECOM	EORA_4	EORA_5	EORA_6	EORA_7	EORA_8	EORA_9	EORA_10	EORA_11	EORA_12
<b>Domestic demand growth</b>													
<b>LI</b> <sup>(1)</sup>	272	-113	-161	92	215	4	97	-602	-768	54	1320	81	
<b>LMI</b>	96	336	-41	8	82	-39	69	-549	-5194	7	34	278	46
<b>UMI</b>	61	53	55	-10	140	31	94	197	112	-268	-1712	98	106
<b>HI</b>	-276	232	388	78	-209	4	-4	214	61	39	-6	11	
<b>Export growth</b>													
<b>LI</b>	0.6	-0.4	-1.7	-0.4	0.4	-0.1	0.1	-1.9	-4.5	-0.6	1.8	0.1	
<b>LMI</b>	0.1	0.9	-0.5	-0.7	0.0	-0.2	0.0	-1.6	-31.5	-0.4	-0.1	0.1	-1.8
<b>UMI</b>	0.0	0.4	0.0	2.1	0.1	1.6	0.1	0.3	0.2	-0.8	-2.8	0.0	0.0
<b>HI</b>	4.4	0.3	0.6	-0.3	-0.3	-0.1	-0.1	0.3	0.0	0.7	-1.3	0.0	
<b>Import substitution</b>													
<b>LI</b>	-172	214	263	8	-116	96	3	704	873	47	-1222	19	
<b>LMI</b>	4	-236	141	93	18	139	31	651	5326	93	66	-178	56
<b>UMI</b>	39	46	45	108	-40	67	6	-97	-12	369	1815	2	-6
<b>HI</b>	372	-132	-289	22	310	96	105	-114	40	61	108	89	

Notes: (1): LDC=least developed countries, ODE= Other developing economies, EIE= Emerging industrial economies, and IE= Industrialized economies.

Source: Author's elaboration based on the Eora Multi-Region Input-Output database (Lenzen et al., 2012; Lenzen et al., 2013) and the EU KLEMS database (O'Mahony and Timmer, 2009).



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